

PROBING NIFE NANOSCALE ALLOY FILMS WITH PHOTOEMISSION MAGNETIC X-RAY LINEAR DICHROISM; <sup>A</sup>G.J. Mankey, <sup>A</sup>R.F. Willis, <sup>B</sup>J.G. Tobin, <sup>B</sup>K.W. Goodman, <sup>C</sup>J.D. Denlinger, <sup>C</sup>E. Rotenberg, and <sup>C</sup>A. Warwick; <sup>A</sup>Pennsylvania State University, Physics Department, College Station, PA 16802, <sup>B</sup>Lawrence Livermore National Laboratory, Livermore, CA 94550, <sup>C</sup>Advanced Light Source, Lawrence Berkeley Laboratory, Berkeley, CA 94720

The magnetic structure of NiFe nanoscale alloy films (thickness of about 1 nm) has been investigated as a function of composition, with full elemental specificity. To do this, we have used the magnetic x-ray linear dichroism (MXLD) in angle-resolved photoemission. FeNi films were grown using MBE techniques<sup>1</sup> upon the surface of Cu(001). The MXLD measurements were made at the Advanced Light Source. While our MXLD work has been based upon the groundbreaking measurements of Roth et al.<sup>3</sup> and subsequent investigations<sup>4,5</sup>, our extension to nanoscale alloy films permits a full utilization of a key component of these x-ray based techniques: elemental specificity. The MXLD results will be directly compared to predictions of a theoretical model<sup>6</sup>. Crucial issues such as the invar effect will be addressed<sup>7</sup>.

This work was performed under the auspices of the U.S. Department of Energy by LLNL under contract number W-7405-ENG-48.

#### References

1. F. Huang, M.T. Kier, G.J. Mankey, and R.F. Willis, Phys. Rev. B 49, 3962 (1994).
2. J.D. Denlinger et al., Rev. Sci. Instrum. 66, 1342 (1995).
3. C.H. Roth, F.U. Hillebrecht, H.B. Rose, and E. Kisker, Phys. Rev. Lett. 70, 3479 (1993); Solid State Commun. 86, 647 (1993).
4. W. Kuch, et al., Phys. Rev. B 51, 609 (1995).
5. G. Rossi, et al., 1995 Spring Meeting of the Materials Research Society, April 1995, San Francisco, CA; Phys. Rev. B 49, 15682 (1994); Solid State Commun. 90, 557 (1994).
6. E. Tamura, G.D. Waddill, J.G. Tobin, and P.A. Sterne, Phys. Rev. Lett. 73, 1533 (1994).
7. I.A. Abrikosov, et al., Phys. Rev. B 51, 1058 (1995).